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First Step in Photography.

By....

F. DUNDAS TODD,

Editor of "The Photo-Beacon."

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First Step in Photography

TELLS HOW TO MAKE

Photographs

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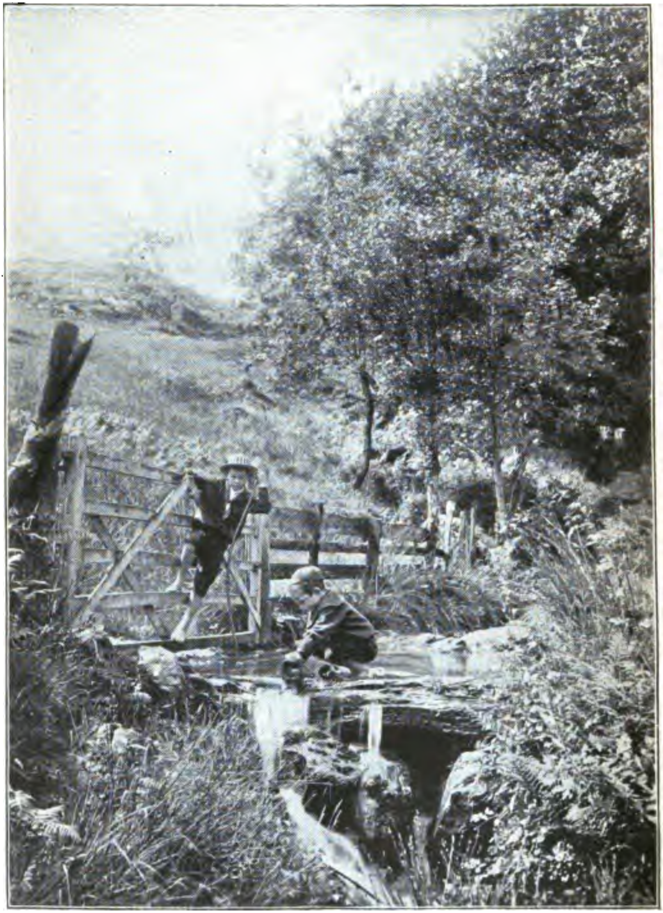

Photographed by F. Dundas Todd.

WHEN THE SUMMER DAYS WERE FINE.

FIRST STEP IN PHOTOGRAPHY:

A BOOK FOR BEGINNERS IN THE ART.

BY

F. DUNDAS TODD,
EDITOR OF "THE PHOTO-BEACON."

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INTRODUCTION.

In presenting this little book to the reader I assume two things: first, that he knows absolutely nothing about photography; and second, that he is anxious to become acquainted with the art. Not only shall I suppose him to be ignorant of the very first principle, but I will take it for granted that he does not even know the meaning of the various terms used by photographers, and will take the liberty of explaining, as it occurs, each word that is used by them in a special sense. All trades and professions use words in a special way, these being generally known as trade or "technical" terms. Now, technical terms are usually not very appropriate, for as a rule they do not express exactly what is understood by the general meaning of the word, and such being the case, I feel I shall be pardoned if I assume the reader to be completely ignorant of the meaning of the various technical terms used in photography.

The mere fact that he begins to read this book will be enough to assure me that the reader wishes to learn how to make photographs. This desire is a very praiseworthy one for many reasons. If the reader be young, I know his sole wish will be to make pictures of scenes and objects that interest him, but if he be of older growth, he will have still another reason — he will want a hobby. He is poor, indeed, who has not a hobby of some sort to take his mind off his business cares and worries, and one can search the world through without finding one so ideal as photography. It will last a whole lifetime, which is more than can be said of most outdoor amusements ; it can be followed in summer and winter, in daytime and at night, indoor and out, in both country and city. And unlike most other hobbies, the pleasure does not end with the pursuit, for the photographer has something to show for his efforts, something that will remind him maybe of a happy day in the country, bringing up the incidents in all their fullness, and at the same time interest and amuse his friends. Surely, such an ideal amusement is worth acquiring, especially when it demands but a few months' earnest application to enable one to produce with certainty satisfactory results. In this I speak from experience, for within two months of buying a camera I was making just as good technical work as I did after years of practice. But I gave the subject honest study, and I expect my reader to do the same thing, and, above all, I expect him to do exactly as he is told. Something like will not do. And he must make sure that he understands each page before he proceeds to the next, even though he has to read it a dozen times. Photography is not a mechanical process, it demands understanding — not much, it is true ; still that little must be perfect, otherwise there can be no success. And, last of all, when he makes a failure, the beginner must not blame the instrument, nor the plates, nor the film, nor the paper, nor the solutions. He must blame himself, and it is a thousand chances to one he will be right. The real trouble was, he did not know enough.

FIRST STEP IN PHOTOGRAPHY.

CHAPTER I.

PRELIMINARY INSTRUCTION.

What is Photography? Photography is writing or drawing by light. Possibly you may have always supposed that the only action of light is that which enables you to see. But that is only one of its properties. With some substances it has a chemical action. Now, I want you to know what chemical action means, so you must follow me very closely for a few minutes. Suppose I take a piece of iron and place it in a fire till it is red hot, I have certainly made a change in its appearance, and if you were to touch it you would find a change in another of its qualities. But it would still be a piece of iron, and even though it should be converted into a horseshoe or a nail, notwithstanding its change of form, it would still be a piece of iron, and would behave under all tests as such. A change merely in the appearance of a substance under the action of some force is called a physical change. But supposing I had placed another piece of iron where moisture and air would get at it, in a few weeks you would find that it also had turned red like the piece in the fire, but on touching it you would find a decided difference in temperature. Very possibly you might find the surface crumble away in very small scales, and if you crushed them between the fingers they would crumble to powder. Were you to now put the iron in a perfectly dry place it would not return to its original condition as did the piece that was in the fire when allowed to cool. The red substance in our second experiment is not iron as at the first, but something with entirely different properties. Were we to heat it in the fire no amount of hammering would convert it into a horseshoe or a nail, but it would simply crumble down into finer particles under each blow of the hammer. Under the action of the elements the iron has united with a gas called oxygen, and the combination, popularly known as iron rust, possesses properties very different from its elements, iron and oxygen. When the result of some action on a substance gives to it new properties that will not be lost when the cause of action is removed, we say a *chemical* change has taken place, which is due to *chemical action.*

Chemical Action of Light.— Light affects a great many substances and that in different ways, one of the most noticeable, perhaps, is its turning white paper into a yellow tinge. But in photography we are most interested in its action upon the salts of silver. And here I must give you a new definition, the meaning of the word "salt" to a chemist. To you it probably means common or table salt, but to a chemist it means what results from the chemical combination of a metal with an acid. Table salt results from the union of a gas called chlorine with a metal called sodium, both of which you very likely never saw, for they have decided objections to being alone in the world and will unite with almost anything to avoid single-blessedness. This same gas, chlorine, has a great affinity for silver, and the combination results in a white substance called chloride of silver or silver chloride. If we take some of this and expose it to the sun's rays it will turn black in a few seconds, showing that light has a chemical action on this particular silver salt. But there are others affected in a similar way. Two substances like chlorine are known to chemists. One is bromine, the other is iodine. These combine with silver to form bromide of silver and iodide of silver, both of which substances behave under the sun's rays like chloride of silver, and all of them on account of this peculiarity are used by photographers.

"Sensitive" as Used in Photography.— A substance that is affected by the sun's rays is said by photographers to be *sensitive.* And so the chloride, bromide, and iodide of silver are called the sensitive silver salts. But they are not equally sensitive, nor do they show the result of the action the same way. The chloride of silver, we have seen, turns black in a few seconds; the bromide, on the other hand, turns to a dull gray; and yet of the two the latter is the more easily affected, for by the application of certain chemicals to it we can turn it black after it has been exposed to the light for the merest fraction of a second. Iodide of silver is very slow, and so in modern photography is but little used.

How the Sensitive Salt is Carried.— We have seen that both the bromide and chloride of silver exist as crystals or in a fine powder; so when we wish to use them in photography we must have some means of holding them in position. Three methods are in common use at the present day, the fine particles being evenly scattered in a thin film of gelatin, collodion or albumen, the film being attached either to glass, paper or thin celluloid to give it support.

Bromide of Silver — Where Used.— Being the most sensitive of the silver salts, the bromide is preferred when the picture is being taken, because rapid action is necessary lest the picture should be spoiled by movement of the object. For this use the salt is carried in a thin film of gelatin, attached either to a glass plate or to very thin celluloid, the latter being known as "film" on account of its thinness.

Chloride of Silver — Where Used.— As silver chloride will darken under the action of light without the aid of chemicals, it is preferred for making the finished picture, which is known as the print. It may be carried in a thin film of either gelatin, collodion or albumen, the film being attached to a support of white paper.

On Light.— I have been saying a good deal so far about the action of light, telling you particularly that it had a chemical action upon certain salts of silver. Now, I want you, as a photographer. to work with intelligence, and so I must ask you to endeavor to understand a little more about this subject. To our eyes, sunlight looks as if it were all of one color—white; but men of science can easily prove to us that it is really made up of a number of colors, namely, violet, indigo, blue, green, yellow, orange and red, which are generally known as the rays of the spectrum. These rays differ very much in their action on the silver salt. For instance, the violet, indigo and blue, produce a very decided effect; the green, not so much; while the yellow, orange and red must act a long time before they produce any definite result. It is important that you should know this, for when you come to handle plates you must see what you are doing, and you must therefore use a light that will not affect the silver on the plates. Just think for a moment over this one point, and you will be prevented making a mistake that is very common with beginners. If a little ordinary daylight reaching the plate while it is in the camera will make an impression on the silver salt, will not a flood of the same light acting directly on the plate have a much greater effect and simply "kill" the faint impression formerly made? So you see you must take great care that no ordinary light, not even from a candle, can reach the plate excepting when you want it, and that is at the instant you wish to make the picture. I will have more to say about the use of red light in a succeeding chapter.

CHAPTER II.

APPARATUS.

Needful Apparatus.—To make pictures by photography a few articles are necessary, and these, by great ingenuity, are now made very simple, compact and cheap—so cheap, in fact, that even the poorest in the land may own a camera that can make good pictures, if they only know how to use it. I have seen really excellent pictures made by a camera that cost only a dollar. I actually own one, and when I go off for a few days' holiday, not wishing to be bothered with much to carry, I generally take one that cost me $8. So do not suppose for one moment that a big outlay of money is essential to success. In photography, brains count far more than money.

The one thing necessary is a camera. This is a box that is perfectly light-tight, having at one end a piece of glass of a particular shape, called a lens, and at the other end a means of keeping in position the glass plate or celluloid film, to which is attached the thin layer of gelatin holding the silver salt. This is the principle on which all cameras are made, though they differ very much in appearance. A simple form consists of a solid box made of wood or metal; others again have only the ends of wood, the sides being of leather, so that when not in use the camera can be folded up into little bulk Each instrument has little ways of its own that must be learned, and as it is simply impossible for me to describe every one in the market, I must leave you to learn them from the instructions sent out by the maker, and will confine myself to telling you something that applies to them all.

The Lens.— First, I want you to learn something about the lens, for it is a very important part of the apparatus. To understand its use you must learn something more about light. In the first place, I want you to know that light travels in a straight line until some object turns it from its path. For instance, a ray of light leaving the sun travels in a perfectly straight line until it strikes an object — say a tree — and then it is bent or reflected in a new direction. Should your eye be in the path of this ray it would enter your eye and you would see the bit of the tree that sent the ray. But the sun sends out millions of rays which are reflected by different parts of the tree, and these all reaching your eye at the same time enable you to see the whole tree. Suppose the lens to be in the place of your eye, the rays would enter the box through it and make a picture on the plate, just as it does on the back of your eye. You must not suppose, however, that the lens is a piece of plain glass, for in fact it has to be of a particular curved shape to bend the rays in a certain direction. You would be all the better for knowing just how a lens acts, but as this knowledge is not absolutely necessary to enable you to make pictures, I will not weary you by describing it.

About Focus.—But there are some points about a lens you must know, especially if your camera be of the kind that has a leather bellows, and these I will explain to you. The rays of light from an object that pass through the lens form the picture at one particular position only, so that the plate on which the picture is to be made must be in that position. This point has a name, being known as the *focus* of the lens, and the distance from the lens to the point is known as *the focal length of the lens.* In small cameras this distance is very short, somewhere about three or four inches, but in larger instruments it is much more.

Variation of Focal Point.—Even with the same lens the position of the focal point varies according to the distance of the object the camera is pointed at. When the object is far away the distance from the lens to the plate is small, but when the object is very near, then the lens and plate have to be farther apart. But with small lenses the change of position of the plate due to the object being nearer or farther away is so small that the eye can hardly appreciate the difference, and, therefore, manufacturers in making small cameras, say those for pictures 3½ inches square or less, fix the lens at a distance from the plate they know to be correct for objects about six or seven feet from the camera, and everything beyond. These cameras are usually known as having a lens of *fixed focus.* If you are a beginner in photography it is more than likely that you have bought a camera of this type, for they are simple in construction and it is easy to learn how to handle them. Their price is also low, for they are to be had as cheap as $1, while the highest-priced one I know costs $8. Good pictures can be made with them, and, as I said before, a little camera of this kind often goes with me when I take an outing, and very frequently I take it backward and forward to business with me to get little street pictures.

Shutter.—You have learned that light will affect the sensitive plate very quickly, and therefore it must be protected until the very instant you want the rays to reach it, and the moment the effect is accomplished, the plate must be again shielded. Now, the light finds its way only through the lens, therefore it must have a covering that can be removed and replaced just when you want it. If you examine your camera carefully you will find either immediately in front of the lens or behind it a metal or hard rubber plate that prevents the entrance of the light. This is part of a piece of mechanism, generally very simple, that is known as the shutter. There are many kinds of them, and so it is impossible for me to describe them all, but you will find somewhere a little piece of metal that on being pressed will cause the metal plate to fly across the lens. In the middle of this plate is a round hole that allows the light to pass through for a fraction of a second — quite long enough to produce an effect, though it seems short — and then another portion of the plate cuts the light off. Possibly the shutter on your

SUPPER

lens may need to be "set"—that is, you must wind up a spring by some simple movement—but the sheet of instructions with the camera will tell you all about that.

CHAPTER III.

HANDLING THE APPARATUS.

Knowing Your Instrument.—Before attempting to make pictures, it must be your business to understand how your instrument works. You are going to shoot with your camera, just as a sportsman does with his gun, and at the critical moment you must be as certain in your actions as he is. So begin at the beginning; take your camera in your hand and go through all the movements a dozen times, just as if you were making pictures. Learn all about the shutter, how to set it, how to discharge it. Then if there be a "view-finder," that is, a little ground-glass mirror which shows just what the lens will give you on the plate, learn what position of camera will enable you most conveniently to watch the view-finder and discharge the shutter.

Camera with Adjustable Focus.—But it is possible you have bought a camera that takes a picture larger than 3½ inches square. If so, it will probably be 4 inches wide and 5 inches long, what, in fact, is known as a 4 by 5. In some cameras of this size, the focus of the lens is from 6 to 6½ inches, and that is too much for the lens to be always set for the same focus, as, were the near objects in the picture clear, distant ones would be fuzzy. So the front of the camera which carries the lens is so made that the distance of the lens from the sensitive plate can be increased or decreased as may be necessary. But, you will ask me, how can you tell just where to put the lens? The answer to this question is to ask you to look at the baseboard of your camera, where you will find a scale marked with figures, and on the movable part of the front you will see a little pointer which will pass over these figures when you pull the front far enough out. The numbers indicate feet, and if you set the pointer at 20, that shows the instrument is adjusted to give clear pictures of objects 20 feet away, but those much nearer or farther away would be fuzzy. When the picture is nice and clear we say it is *sharp*, but when it is fuzzy it is said to be *out of focus*. Please remember these two terms, for I shall have to use them very often. But there is still another way of knowing when the picture is sharp, or in focus. If you examine the back of the camera you will find a sheet of ground glass; very likely you will have to remove a little panel by pressing a button before you can see it. The purpose of this ground glass is to show you just exactly what you are going to get when you want to make a picture, for the rays that pass through the lens will strike on the glass just as they will do on the plate.

Focusing.— Of course, you want to see what the picture looks like. Well, open the shutter and then rest the camera on the sill of a window — taking care first to open the window — and point the lens at a house opposite. Now sit down on a low seat so that your eyes will be level with the glass. It will be all the better if you throw a black cloth over your head and the back part of the camera so that all the light that reaches the ground glass comes through the lens. Keep your head back so that your eyes shall be at least a foot from the camera, and look *at* the glass; don't try to look through it, and in a few seconds, when your eyes get accustomed to the change, you will see an image of the house, but it will be upside down. I have known some people turn the camera upside down to try to get the image right way up, but it made no difference; the picture is always that way, no matter how the camera may be turned. You will therefore have to get accustomed to seeing pictures wrong side up, and in a very short time you will get so accustomed to it that you will never think anything about it. Now examine this image and see if it is clear. Do not let your eyes wander over the whole picture, but choose a little bit of the house that has a lot of detail in it, the porch for instance, and see how that is. If it be the least fuzzy, that means the lens is not at the right distance from the glass, and so you must get it correct. Reach forward your right hand to the catch that holds the front in place; loosen it and then move the front backward and forward until you get the position that gives the porch, or whatever it may be, clear and distinct. Then fasten the catch, and if you examine the rest of the picture you will find it all sharp. If you now look at the scale I spoke of you will find the pointer at a number that should be the same as the width of the street in feet. The image is now *in focus;* what you did is called *focusing*, and because it was done on the ground glass the latter is often called the *focusing screen.* And while I am explaining words I may draw your attention to another one. When the image is clearly and sharply *defined*, we sometimes say that the *definition* is good.

Stops.—While the camera is on the window sill you had better try another experiment. If there be a tree or a lamp post just in front of your house, that is, on your side of the street, point the camera at it and you will find the picture is quite out of focus, and so you must do the focusing all over again. But the moment you get the tree sharp you discover the house across from you is now fuzzy, and, of course, you would like them to be both sharp at once. Well, it is possible to gratify your wish. Take your camera up in your hands and once more take a look at the lens, for you have got to learn something more about it. If you look inside the tube you will find a ring that reduces the size of the passage somewhat, and if you investigate a little farther you will find there is a means of making the opening still smaller. Learn how it works — I cannot tell you as there are quite a number of methods, and I do not know which is in use with your lens. Once you know what to do, point the lens at the tree, then keep your eye on the image of the house, and with your right hand move the mechanism that contracts the ring in the lens — very slowly, please, so that you can note the change that takes place. As the passage in the lens gets smaller the image of the house becomes sharper, and before you have gone far it will likely be as sharp as you want. Whenever that happens, stop, for while you have been gaining in definition you have been losing something else. At first the picture was very bright, but as you made the passage smaller you cut off more and more light, so that it grew less bright. In other words, the narrowing of the ring will "stop" the light, and hence this little opening is called a *stop*. Another name for it is the *diaphragm*. Do not forget that the smaller the stop the better the definition, but the weaker the illumination or lighting, for I shall draw your attention to this point again.

CHAPTER IV.

GETTING READY TO MAKE PICTURES.

The Darkroom.—By this time you have learned something about photography and your camera if you have read the previous chapters very carefully, and you are very anxious to make some pictures. Make haste slowly. A good workman is never in a hurry. He knows what he is doing, and every act is accomplished in due order because he knows the right time to do it. So I will say to you again, Get a thorough knowledge of your tools, so that when you make a failure you will not have to excuse yourself by saying: "I forgot to do this." In photography everything has to be just right or there is no picture.

Loading the Camera.—I will suppose you have learned your lesson, however, and are fit to go on to the most important stage. But before you can try to make a picture, your camera must be *loaded*, that is, it must be provided with the sensitive plate or film I spoke of in Chapter I. You will remember that there it was said that bromide of silver, held in a thin layer of gelatin which was attached to a support of glass or thin celluloid film, was the sensitive silver salt that was used in the camera.

Photographed and copyrighted, 1894. By F. Dundas Todd.

FOURSCORE AND FOUR.

I do not know whether you are going to use glass plates or film, and so I will have to describe how the camera is loaded with either.

Loading with Film.—If your camera is intended for use with film only you will easily learn how to load it, for you can do it in the light of an ordinary room. The film is supplied by the maker in a long strip nicely wound onto a spool, and is protected from daylight by many rolls of black paper. All you have got to do is to open your camera and follow the instructions. But remember that you must now be careful to see that the shutter is kept closed, as the least light entering will have as much effect upon the film as if you were making a picture.

Loading with Plates.—But if your camera is meant to be used with plates you will have to be more careful. Ordinary light, as you learned in Chapter I, has a very decided effect on the silver salt, and, as the plates have to be handled one by one, it is not possible to protect them with paper as in the case of the roll of film. Besides, one must see what one is doing. Now, we saw that yellow, orange and red light had but little effect on the sensitive salt, so whenever we have to handle either plates or film where we must be able to see what we are doing, it must be with a light of one of these three colors. A shade of red called ruby is generally preferred, though some, on the other hand, like orange. As ordinary post-office paper is about this color it is frequently used. But I would advise you not to attempt to make your own lamp to begin with, as you do not know what is actually a safe light, but would rather recommend you to buy one. They can be had at prices to suit all purses.

Appearance of a Plate.—Choose a room or a closet that you can make absolutely dark, say by drawing down the shades and then hanging over the window some thick opaque cloth, fastening it on the upper part with drawing pins or tacks. Close the door and wait a few minutes to see if there be any stray light coming in anywhere. If so, cut it off, especially if it be higher than the table on which your box of plates is to be laid. A little streak, if not bright, coming in below the door will not do much harm, but the same amount coming in from above the door would spoil the plates in a few seconds. If everything is right, bring in your lighted lamp and set it near one end of the table, say at your right hand. Place the box at the other end, so that at least three feet shall be between the lamp and the plate, for remember, even red light will spoil them. Now get your pocketknife or a letter opener, then take the box of plates in the left hand and lay it face down on the table. On examining the edge you will find paper pasted all around it, and before you can get into the box you must cut this all around. Begin at one corner by feeling with your thumb nail for the space between the box and the cover, and once found, push in the point of the knife, then run the blade to the other end. take the other sides in turn until the paper is all cut, making sure of the corners. Now put the knife in your pocket where it will be out of the way. Don't smile at my being so particular, for I want you to be methodical and not to hurry. Now pull off the cover; you will find still another one, and this should be next removed. Black paper next reveals itself. Please note how careful the makers are in protecting the plates from light and take a lesson from their example. On folding back the paper you will see what is seemingly a piece of glass. On trying to take it out you may find some difficulty. Replace the paper again and on feeling between the pasteboard and the paper you will find some slips of paper inserted to keep the plates from moving. Take them out, and now you will have little trouble in getting out the sheet of glass. Of course you want to see what it is like. Well, unless you are a very lucky person you will probably spoil a good many of them before you learn much about photography and you may as well begin your career by wasting one on education. So replace the cover on the box and then go out into the bright light with the plate in your hand and have a good look at it.

You will find one side is just plain glass, glistening with the rays of light that fall on it; the other is of a creamy yellow color but is dull, reflecting little light. Once you have satisfied yourself go back to your darkened room — it is generally called the *darkroom*, although it is not absolutely dark — and have another look at it. As before, the glass side glistens, the other side does not, so here you have a simple means of knowing which is which.

Loading the Plateholders.— For use in the camera the plates are held in position in a thin double-chambered box called a *plateholder*. Before filling yours with plates it may be as well for you to experiment a little, but in good light, and so I would ask you to take a plateholder and the plate you have been examining, into an ordinary room. Pull out the slides of the holder and learn all its little ways. It is, as I have said, a double-chambered affair, divided in the middle with a thin partition of cardboard to prevent the light reaching the one plate, when you make a picture on the other. There is a simple method of holding the plate in each chamber, which it is now your business to find out, and I am sorry to say I cannot help you, as each maker has his own device. When you have learned the plan, insert the plate with the glass side next the pasteboard partition, and this will give you the film side next the lens when the holder is in the camera. Now replace the slide, and in doing so I want you to learn a little trick that will save you many disappointments. When you started the slide in the slit it is more than likely you inserted one corner about the middle, pushing it in about half an inch, then brought the corner to one end and pushed the whole thing home. Were you to do this out in the light after making a picture, you would ruin the plate entirely, for right in that narrow slit there is a little valve all the way across to prevent light sneaking in when the slide is out, and when you insert the corner of the slide far enough you open the valve and light gets in. What you must do is this: Start the corner just a little way in at the lower end, then straighten up the slide until all is in about the sixteenth of an inch, then shove the slide quickly home, without stopping. But you must not bang it, for if there be a speck of dust in the slide it will jump from its place, and be almost sure to land on the film to your regret afterward. Take another look at the slide, and very likely one side is different from the other. Possibly the word "*exposed*" is printed on one. This is to prevent you trying to make two pictures on one plate, which you would find to be false economy. When you load always place the same side out; after you have made the picture turn the other side out; if the slide bear the word "exposed," that word should be inside when you load, and outside after the picture is made.

Now if you have learned this little lesson return to the dark-room — shut the door, please — fill up your holders, and if any plates be left in the box see that you do not forget to replace both covers. In placing the plates in the slides be at least three feet from the light, more if it be bright enough to enable you to see comfortably, and avoid letting it fall on the plates a second longer than is necessary.

I know you are just wearying to make your first picture. I was that way myself once, and though I have made about ten thousand since then, I am just as anxious to use the camera as I ever was, so I sympathize with you, and will at once tell you how to do it.

CHAPTER V.

MAKING THE PICTURE.

The First Subject.— What is your first subject to be, a house or a baby, a dog or a donkey, or the portrait of some relative ? Let me confess, I was foolish and began with a baby — and such a restless imp he was, too. He is bigger now but more lively than ever, and simply hates being photographed because he has had it done too often. And of all places, I tried him in the house, where I was told to give at least fifteen seconds time. Fancy a baby keeping still fifteen seconds. I know more about babies now, and I can assure you they never keep still fifteen seconds at a time nor anything like that. So I placed him on his mother's knee, and when I came to make the picture I thought to interest him by counting fifteen and keeping time with my hand. But the little rascal was very much interested in the camera. He thought he ought to learn all about it, so when I counted and waved my hand he jabbered his little tongue and waved his fat fist. When I got to the next stage I found a lot of baby scattered over the plate, but not enough in one place to let my friends know whether it was a baby, or a cow, or a setting sun. So if you are wise leave babies alone for they cannot keep still.

Take a House First.— Now, a house will keep still, so I would advise you to begin with that. Do not for a moment suppose that I have set you too easy a subject when I suggest that you begin with a house and turn up your nose in contempt, for although a house will not run away it is not so easy to make a really fine picture of it. I remember that I knew all about photographing a house — and for that matter everything else — within three months of starting photography, but six years after I was just beginning to learn something about how to do it. It took me all that time to learn something that I want to tell you at the very beginning, and it is this, that one of the sides of the building included must, if the sun be shining, be in a shadow, and the other in light. Because *light* makes the picture, a beginner is apt to think that he cannot have too much light and that shadow would be a drawback, but this is far from being true, for shadow is just as important as light to get pretty pictures.

I said one of the sides included must be in shadow. You see I supposed you would show two sides, and I mentioned that especially, as many take only the front of the house. But only one side gives a poor idea of how the house looks, and so two sides must be taken.

Photographing with Fixed-Focus Camera.—If your camera be of the fixed-focus pattern without stops, all you need to do is to point the lens at the object and snap the shutter when you see the little picture in the view-finder just as you want it. Then wind on a new piece of film, or bring forward a new plate as in some plate cameras, where the plates can be brought forward in turn. Or if the plates be in holders you must draw out the slide before you make the picture, and return it at once after it is over, pull out the plateholder, turn the other side so as to have a fresh plate ready, and when you want to make the next exposure pull out the slide and go the round again. Each time you make a picture you *expose* the plate or film to the action of the light and hence you are said to make an EXPOSURE. This word has also another meaning, for it is applied to the length of time the plate is exposed. For instance, if the shutter be open one-tenth of a second, we say the EXPOSURE was of that duration; if it were two seconds, the plate would have two seconds EXPOSURE.

Length of Exposure.— How long to expose is a problem to even the most experienced photographers, but in a simple camera like the above there is little trouble, for the manufacturers have made it for a certain purpose. They know by experience that in this country most photographs are made in the summer months when the light is keen and bright and the trees bear their leaves; or in the short days of winter when snow is on the ground, and these fixed-focus cameras are made to suit these conditions. So long as you make pictures of houses, trees, landscapes, people and animals out of doors in bright sunshine you will get the right exposure every time, but you must not try pictures of sea or lakes excepting just after sunrise or before sunset, and at these times you must not expect good pictures of the other subjects.

Fixed-Focus Cameras with Stops.— Some fixed-focus cameras, however, are provided with a few stops, generally three. These enable one to make good pictures of bathing scenes and other water pictures, as by turning in one of the small ones the very strong light is cut off. The smallest stop of all is generally used for sea pictures taken in the middle of the day.

Focusing Cameras.— These are generally provided with a variety of stops and a shutter that allows of different rates of speed. Both have numbers, as a rule; that on the stop to tell its size, that on the shutter to mark how fast it is going at the moment of making the exposure. A camera of this class gives a very wide range, and with it pictures can be made under almost any condition. But with the extra possibilities there is need of greater knowledge on the part of the photographer, and in this little book it is not my intention to say much about theory excepting where I must. I shall not set forth page upon page of figures in an endeavor to explain how to use them, but will prefer to leave this subject to a more advanced book. Besides, I have provided for the practical use of the photographer who has a camera of this class in a little book entitled "Exposure Tables," in which is set forth the correct exposure under every condition that can be met with out of doors. Full particulars will be found in the advertising pages.

end

CHAPTER VI.

DEVELOPMENT.

What is Development?— An exposed plate does not differ, so far as the eye can judge, from one that has not been acted on by light. To reveal the work of the sun's rays the plate has to be treated with a solution of certain chemicals that will blacken the plate where the light has acted, but where it has not been affected the gelatin film will keep its creamy yellow color. This treatment of the plate to bring out of it the result of the action of light we call *development*, and the solution of chemicals by which it is affected is called a *developer*.

Varieties of Developers.— There is plenty of choice as to developers; far too much, indeed, so far as the beginner is concerned, for when he fails to make good pictures he at once blames his tools and rushes off to try others. Now, I want to repeat what I have said before, and I say it again, so that you will not forget it: the only way to learn photography is to stick to one thing until you master it. So with development, choose one developer and do not allow yourself to be changed from it on any consideration. You will find plenty of photographic wiseacres who will tell you that what you are using is no good, and that what they use is perfection. Do not be led away by such talk, for speaking as one who has done a great deal of experimenting, I can assure you that any recipe or *formula*, as photographers call it, published by a reliable authority, can be depended on. But they all have their little peculiarities, which can be learned only by experience, and anyone who is changing from one to another all the time can never learn all that should be known about one.

Kinds of Developers.— Developers are usually named after the chief ingredient. The principal are: pyrogallic acid (commonly called pyro), metol, eikonogen, hydrokinone, and amidol. One of them at least, pyro, is a rank poison, for which no antidote is known, and therefore must be handled with care. A solution of it should not be allowed to stand round where children can reach it, or where it might be mistaken for a beverage and drank by mistake. Every now and then one reads of poisoning accidents due to such carelessness. Of the others less is known, for nobody cares to be the first to swallow them to test their poisoning power, and so far I have come across no accidents due to their being swallowed by mistake.

What Developer to Choose.— It may safely be said that the platemaker knows better than anybody what is best to use with his plates, and I would recommend you to follow his instructions. Which kind to select will depend upon your habits. Pyro, the most popular of all, has a decided tendency to stain one's fingers badly, and is much objected to on that account by many. The others are more free from this fault, and possibly are more suited for that reason to those whose occupation leads people to expect hands free from stain.

Formula for Pyro Developer.— I give here the formula for a pyro developer that I generally use, not because I think it better than any other, but because I have been accustomed to it. It is easy to prepare, and the quantities are such that it is easily measured.

All solutions must be kept in close-stoppered bottles.

SOLUTION A.

Warm boiled water	12 ounces
Sodium sulphite	3 ounces
Citric acid	60 grains
Potassium bromide	20 grains
When cold, add:	
Pyro	1 ounce

SOLUTION B.

Warm boiled water	12 ounces
Sodium sulphite	3 ounces
Potassium carbonate	3 ounces

Just before developing take one dram of each and add two ounces of water. This will be sufficient for a 5 by 7 plate; for a smaller size half the quantities will do. A pyro developer should be used once only.

Solutions A and B when in close-stoppered bottles ought to keep for months. When carefully prepared, solution A is of a light straw color; should it turn black, it is useless.

Formula for Tolidol Developer.—

AMERICAN WEIGHTS AND MEASURES.

Water	16 ounces
Tolidol	24 grains
Sodium sulphite	72 (144) grains
Sodium carbonate	96 (240) grains

The first figures are for *dry* chemicals and the figures in parentheses are for crystals. It will be seen that in every case the weight of sulphite required in crystals is double that of dry sulphite, while the weight of carbonate crystals is 2½ times as much as dry carbonates.

It is best, but not absolutely necessary, to use hot water in preparing this solution, but the developer must be cool (from 60° to 65° Fahr.) when in use.

Dissolve the tolidol first, then the sulphite, the carbonate last.

This developer may be used repeatedly until exhausted, which will be shown by its taking a long time, say half an hour, to develop a plate. In giving a choice of two developers I feel I have given enough. The pyro solution should be used only once, certainly not more than twice, as it soon gets very black and stains the plates badly. Tolidol will remain clear, although used a dozen times. Moreover, the tolidol developer will not stain the film of the negative, and it neither stains nor injures the fingers.

Tolidol can be used for developing plates, films, lantern slides, bromide paper or any of the well-known makes of developing papers.

Making Up Formulæ.—It is not every photographic beginner that owns a pair of chemical scales, so I would suggest that he take the chemicals to his druggist, who will usually be obliging enough to make them up for him.

Preparing for Development.— Before you think of commencing to develop, you must have everything prepared and put in its proper place so that you can get at anything you want in the semi-darkness without any trouble. In the first place, you must select a place in which to work. For this purpose nothing beats the kitchen, excepting always, of course, a room specially arranged for the purpose. Make arrangements then, if possible, with the domestic powers for the use of the kitchen after dark, and you will be well suited. Failing that, or if you want to develop in the daytime, the bathroom will be found convenient. But when this is used the window must be thoroughly blocked up. For this purpose I find a couple of dark-colored blankets fastened by tacks answer admirably. But if this room is to be used frequently, it is better to make a frame to fit the window — which may be covered with thin cloth of any kind and then pasted over with one or two layers of brown paper. Whichever method be adopted, the covering must be absolutely light-tight, special attention being given to the edges. Failing the use of either of these places, an ordinary room can be utilized at night, or a fair-sized dark closet in the daytime, though it must be confessed the latter is a very uncomfortable spot in hot weather.

Requisites for Developing.— The essentials for developing are not very numerous, consisting of the developing solution, hypo solution for fixing, a couple of trays the size of the plate to be developed, and a 4-ounce glass measure, commonly called a graduate, a cup or glass tumbler, and a good supply of water.

Preparing Hypo Solution.— Take half a pound of hyposulphite of soda, commonly called hypo, place it in a quart bottle and fill the bottle nearly to the top with warm water. But be careful how you pour it in, lest the sudden change of temperature crack the glass. The better way is to pour in cold water first, say a teacupful, then add a little hot water at a time until the bottle is nearly full Every few minutes it should be stirred — a slip of wood will do very well, being thrown away after use — until the crystals are completely dissolved. I want to draw your attention to one peculiarity about hypo when it is dissolving. The temperature of the water is lowered very considerably, and in a few minutes after you have poured in the hot water you will find the solution quite cool. Had you used cold water it would be so cold that its action would be very, very slow when you came to use it.

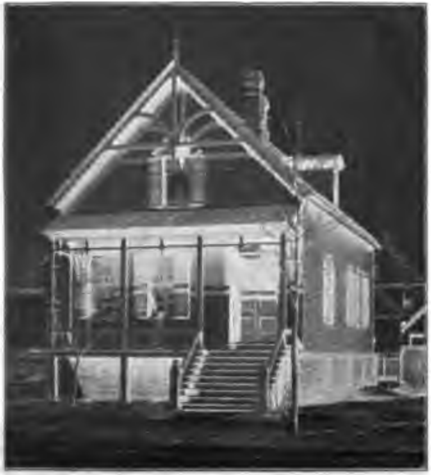
Temperature in Development.— The temperature of all the solutions used in development is a most important point. They should if possible be between 60 and 70 degrees. If colder than that, they will act very slowly and give poor results; if they should reach 85 degrees they will melt the gelatin. The temperature of an ordinary room, excepting in hot weather, is just about right.

Arranging for Development. — I will suppose your chemicals all prepared, your plate exposed, and you are about to develop it. I know you are anxious to begin, but please do not hurry. Go at your work slowly and deliberately, and you will fare better in the end. First get some definite arrangements for the various articles you are going to use, so that you can reach any one of them without trouble and without risk of knocking something over. Suppose I describe how I set about getting ready, and this may guide you. I use the kitchen sink, so that I am very much like yourself, and what suits me will probably do for you. All my "stuff" is stored on a shelf in the pantry, and when I have a plate to develop I can usually guarantee to hand over the kitchen in little more than fifteen minutes from the moment I begin to make ready. I start by producing a couple of boards — they were originally one, but they have split through use and really they are better that way — each about four inches wide, and just long enough to span the sink. Were I not too lazy I would make a sort of spar grating which would be a big improvement. Next I light the lamp which I hang by a string to a nail on the wall, but about a couple of feet to one side and about two feet above the level of the sink. Then I bring out the trays. The one for developing I put on the boards I spoke of, the one for fixing is placed just below the lamp. The hypo solution I keep in a preserving jar, so that all I have to do is to pour it into the dish and place the bottle below the sink. After touching the hypo bottle and before doing anything else, I wash my hands. In fact, I am always washing my hands during development — one of my good habits. Then I set the holder with the exposed plate in it leaning against the wall at the end of sink. Last of all, I bring out the developing solutions, measure out what I need and put in the cup.

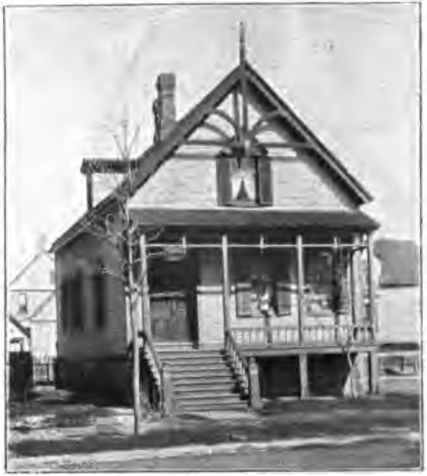
How to Handle Stoppered Bottles.— A glass stopper should never be laid down, for it will be almost certain to get something on it that may spoil the chemicals. To avoid laying it down, proceed as follows: Take the graduate in your left hand, placing its foot between the first and second fingers so that the weight rests on the latter, and with the thumb pointing upward to steady the body. The third and fourth fingers are thus free. Now take the bottle in the right hand, and grip the stopper with the free fingers of the left, pull it out, raise the graduate to the level of the eye, pour out the quantity you want, and replace the stopper.

Pouring on the Developer.— Make up sufficient solution in the developing cup, as called for by the formula. Turn off the light in the room, take the plateholder in your hand, keeping it, however, at least a couple of feet from the lamp — three feet is better; take out the plate and lay it film side up in the tray. Then take the cup with the solution in the right hand, and the tray in your left, and pour the contents of the cup over the plate. It is very, very important that you wet all the plate at once, for if you miss one little bit at first it will be longer in being acted on than the rest and will show a nasty mark. It is quite an art to pour on the solution the right way, and it is worth your while to practice with a spoilt plate and ordinary water until you can do it right. Here is how I accomplish it. I hold the tray sloping first a little downward to the right, and I place the lip of the graduate on the edge of it, at the end next me. On pouring, the solution runs up the hill, so to speak, but it also spreads sideways. But the moment I

A NEGATIVE



AND PRINT FROM IT.



This negative was made by rule. The exposure given was what was called for in The Photo-Beacon Exposure Tables. The plate was developed with the hydrokinone developer, on page 28. The image appeared in 40 seconds, and the whole time in the solution was 3 minutes, 20 seconds.

begin to pour I push the graduate from me, so that as it empties it wets at least one-half of the plate. Just as the graduate reaches the farther end, I lower that end of the tray so that nearly all the solution runs in that direction ; then, and it is all one movement, I tilt the left side downward so that the solution runs to the other corner ; then, still continuing the motion, I raise the far-away end and the solution flows toward me and wets the remainder of the plate. All that takes a long time to describe, but in practice it is done in an instant. Through force of habit, just as soon as the graduate reaches the end of the tray, my left hand gives a swinging movement and the whole thing is done.

The Appearance of the Image.— In a few seconds, generally about thirty if everything be right, a slight darkening will appear on the plate. If it be a building or a landscape you took, it will be the sky that will show first, and by-and-by detail after detail will show itself and soon you will have the whole of the subject before you, but there will be one big difference — everything is reversed. What was white in the subject is black on the plate, and what was black is white. The sky is very black, and the heavy shadows are almost white. What was on your right hand is now on your left. Of course, you are exceedingly anxious about it, and are just fidgeting to get close to the light to have a good long look at it — in fact, are so impatient that you want to take it out and get out into daylight to examine it thoroughly. I know it is your own, your very first, but keep cool. Keep back from the light and just let it lie in the dish until development is finished. The only thing you have to do is now and again to rock the tray so as to bring a fresh quantity of the solution in contact with the film. Give the dish a tilt every ten seconds or so, and wait patiently until the plate attains what photographers call sufficient density. When the detail is seemingly all out, one is apt to think that development is finished ; but you would find that if you stopped then you would get a very flat picture, so you must wait until the plate gains more contrast, and remember this, the longer the plate lies in the developer the more contrast you will get. But you will ask me, When shall I stop? That is a very important question. I shall answer it in the next paragraph.

When to Stop Development.— There are more pictures spoiled at this stage than at any other. Until very recently it was possible for each individual to rely on experience alone, and even with that many fail. But Mr. Alfred Watkins, a famous English amateur, tackled the problem in a scientific way and has devised a simple rule that works like a charm. I have used it steadily for two years with the happiest results, and I have given it to many beginners who, following it, have got good negatives from the very start, so I can confidently recommend you to do the same. Mr. Watkins discovered that development proceeds at a regular pace, and if one knows how long it took to proceed a certain distance on the journey, it is easy to calculate how long it should take altogether. Now, in developing a plate there are two distinct stages. The first extends from the moment that the developer is poured on until the image begins to appear, the second from the appearance of the image to the end of development. The one always bears a definite proportion to the other, so that if we know the duration of the first we can easily calculate the second, by multiplying the time by a certain number which is called the multiplying factor. This number depends upon the nature of the developer, and to a less extent upon the plate.

How to Use the Factor.—Suppose I illustrate this. I will presume you are using the pyro formula I gave you, the multiplying factor for which I know by experience to be 6. I place my watch on the bench beside me so that the light from the lamp falls on it. Just as the second hand reaches the even minute, I pour on the developer. I now carefully watch the plate and the instant I see a trace of darkening I again look at the watch, and usually I find thirty seconds have elapsed. The factor I have just said is 6, and so I figure out that six times thirty makes 180 seconds, or three minutes, and that is the *total* time of development. So confident am I of the result I give no more attention to the plate, but keep my eye on the watch until for the third time the second hand reaches the even minute, and then I pour off the solution into the sink. I place the dish under the tap and allow the water to flow gently on it, give it a swish around, pour it off and repeat. Then I take out the plate and place it in the hypo solution to fix.

Factor for Tolidol.—The Tolidol developer may be handled in the same way, the factor in this case being 8 with newly made bath.

Variation of Factor.—The factor I have given may produce pictures that do not suit your taste. They may be too flat, or they may be too contrasty. The remedy is simple. If too flat, use a higher factor ; if too contrasty, use a lower one.

How Long to Fix.—Fixing must take place in the dark, or at least only in ruby light. When the plate was put into the hypo it showed a considerable amount of white on the surface probably, and certainly all the back was that color. In a few minutes it changes color, as you look at it lying in the solution, and if you lift it out and examine the back the color is found to be disappearing, and by-and-by it will be all gone. But you must not suppose that fixation is complete because it no longer shows white. As a matter of fact, the work is but half done, and the plate should lie in the hypo at least double the time that it takes to clear.

On Cleanliness.—A word on cleanliness may not be out of place here. Dirt is matter in the wrong place, and in photography matter in the wrong place may do a great deal of harm. It does little harm to allow some of the developing solution to get into the hypo, but if we reverse matters and let hypo get into the developer we shall in all probability spoil the plate. So be cleanly. Get into the habit of rinsing the fingers under the tap the moment they come from any solution, and then dry them. The habit once formed is mechanical, and if the fingers be *always* washed no harm can ever come. But remember, do not touch the handle of the water tap with the dirty fingers, for if you do, the very next time you touch the tap you will get the solution on them. I always push open the tap with the palm of the hand, and after washing close it with my fingers, and there is no chance of contamination.

Washing the Plate.— Once the plate is thoroughly fixed it has to be washed to free it completely from the hypo. Begin by holding it under the tap and allowing the water to play freely in a gentle stream over it, first one side and then the other, for about half a minute. This will clear away the adhering solution, and a good deal of what is in the film. Then place it in a dish, face up, and cover it with water. Every five minutes pour off the water, and give the plate a fresh supply. This continued for an hour will be sufficient, and at a push half that time may be enough, if the water has been changed more frequently. Washing operations may be carried on in ordinary light.

To Know the Film Side.— Perhaps when you were holding the plate under the tap and turning it round about, you forgot which was the film side and when you examine the plate you find you cannot tell the one side from the other. What are you to do ? Tap a corner gently against your teeth, and the sound will tell you which is which.

Drying the Plate.— It is important that the plate should dry rapidly, the quicker the better, but strong artificial heat must not be applied, for if the temperature be much above 80 degrees the gelatin will melt. Begin by standing it on the bench at the sink for about five minutes to allow the surface water to drain off. Then if it be warm weather stand it where a draft of air will play upon it ; if it be in cold weather it can be placed on any convenient bracket, film side out. I use one in a corner of the room near the register. The plate should be perfectly dry in the morning

A Negative.— In the morning take the plate, go to a window, and with the sky for a background have a good look at it. As I said before, everything in the subject you will find reversed. All along I have been calling it a plate, but the moment it left the fixing bath it had got a new name, and from that time henceforth is to be known as a negative, a term that means in photography reversed. So in future we will be correct and call it by its proper name. Well, examine your negative, and if it be a good one you will have no trouble in recognizing the fact, for everything will be clear and distinct and brilliant.

Under-Exposure.— If it be decidedly black in the white parts of the subject, but be clear glass in the black parts or shadows, that means it did not get enough exposure, and you must give it longer next time.

Over-Exposure.— But if it be full of detail and look flat and insipid, at the same time pretty black, that points to over-exposure, and you must give less time.

Under-Development.— Plenty of detail, but a flat negative not very black anywhere, shows under-development. The cure is a higher factor.

Over-Development.— Plenty of detail, but great contrast, shows over-development. Use a lower factor.

Judging by Proofs.— The best test, however, will be when you come to take a proof. The negative is only a means to an end, and it is a hard matter to say how a negative will print until it has been tried.

CHAPTER VII.

DEVELOPING FILMS.

Special Points About Films.— A film differs from an ordinary plate in the fact that the silver salt is coated on a thin film of celluloid. The advantages of films lie in their great lightness and in the fact that as they can be rolled up they occupy very little space. To the tourist they are of inestimable advantage, and have many points to recommend them to the ordinary worker. Hence their great popularity.

Special Features About Handling Films.—The first noticeable point about a film when one proceeds to develop is its tendency to curl when first placed in the water, but this is a trouble easily got over by permitting them to soak for a little in clean water.. But I would like to draw particular attention to a more important feature too often neglected. In holding a glass plate up to the lamp for examination we grip it by the edge so that our fingers do not touch the film at all. But in handling films we must catch them between thumb and forefinger. Now, the temperature of the body is above the melting point of gelatin, and the result is that in hot weather, even although the baths may be fairly cool, if we hold a wet film but a little while the gelatin will probably melt where the thumb touches it. A glass plate caught the same way would hardly be harmed, as the heat would be absorbed by the glass.

To Handle Small Films.—Reasoning from the facts just given, we can see that an excellent way of handling narrow bands of film will be to get pieces of glass a little wider than the film and long enough to equal a few negatives. The edges may be dulled by rubbing with a rough file, sandstone or such. Place the film on it face up, and slip a rubber band around each end to fasten the two together, and you are now practically handling glass plates.

Development of Films.—The makers of film issue instructions with every roll that are so good that I can only advise to follow the instructions absolutely. With a little experience you can soon find the factor for the developer recommended, or you can use the one you are accustomed with. But in other matters follow the recommendations. Especially, see in the fixing and washing baths, if you have a batch of negatives, that they are being constantly changed from bottom to top, so as to allow the fluid to reach every part freely. And last of all, see that you measure both the glycerin and the water in the last bath. Too little glycerin makes the films curl outrageously, while a little too much renders them moist and blotchy.

CHAPTER VIII.

TEMPERATURE TROUBLES IN DEVELOPMENT.

Hot-Weather Troubles.—The chief trouble in summer is the tendency of the gelatin to melt, especially in hot, muggy, thundery weather. When the latter conditions prevail it is better to avoid development altogether. In hot weather, pure and simple, the developing bath should be kept cool with a lump of ice in the corner of the tray, and the hypo bath should be made up with cold water just before use. This, as I have already told you, will make it very cold. In washing, use plenty of water, for the larger the volume the slower it heats, and change frequently. In drying, place the negatives where they will catch a breeze or a current of air.

Cold-Weather Troubles.—The danger here is in having the developing solutions too cold. See that they are from 60 to 70 degrees and all will go well. But it is not enough to heat the bath, as, if the trays be cold, the fluid will soon be lowered in temperature. To prevent this the dishes should be warmed by hot water being poured into them before they are used, or, better still, the developing tray should be placed on a basin containing hot water, when the steam will keep it warm enough. Should it get too hot it can be removed.

CHAPTER IX.

PRINTING AND TONING.

Kinds of Printing Paper.—There are many varieties of printing paper, but with amateur beginners only three are popular, and so I will confine my atttention to them. They are "blue paper," "aristo paper," and "bromide paper."

Blue Paper.—This paper is so called because it gives a blue-colored picture, and is much used by architects and such for copying plans. It is exceedingly simple to work, all that is necessary being to place the negative in a printing frame film side up, and then lay the paper with the prepared surface next the film, put on the back of the frame and then expose to daylight, sun or shade as may be convenient, only direct sunlight will print much faster than the other. When sufficiently printed—and experience is the only guide, but the print must be very dark, so much so that nearly all detail is blocked up—it is washed in a few changes of water and then dried.

Aristo Paper.—These are sometimes called glossy papers. Under this title is included a number of different papers known commercially by various names, but all agree in one point, they are sensitized with chloride of silver, which is held in position either in gelatin or collodion. The gelatin emulsion is generally supposed to be the easier to work and is most favored by beginners, and I will therefore describe the method of working it.

BEFORE THE FEAST.

How Marketed.—The printing paper is marketed in packages of cut sizes in dozen or gross lots. As it is very sensitive to light it should be opened only in subdued daylight, and when a sheet has been taken the balance should be returned to the package as quickly as possible. The selected sheet is placed in the printing frame with prepared surface next the film or plate, and then exposed to either direct sunlight or the light of the sky. Printing proceeds pretty rapidly in sunlight and soon will appear an outline of the picture, then detail after detail will come up. Of course you cannot see all this going on by looking through the negative, so at intervals you have to open one-half of the back and examine the progress made. Need I say it must be done in subdued light? Well, in due time the print will look just as you want it to be. But you must not take it out just yet, for there are a few treatments for the print to go through before it is finished, and it will lose considerable of its vigor. This must be allowed for and so you must print much deeper. How much is hard to define. "Two shades deeper" is the term generally used, and what it means you will learn by experience.

AFTER THE FEAST.

What We Have Got.—Now that we have secured a print let us stop a moment and see what we have got. The paper originally had on its surface chloride of silver, and the light has set free the chlorine of some of it and has deposited in its place silver alone, and of this the picture is formed. But we have still left most of the original silver chloride, and should we expose the print to daylight it would soon darken all over. To prevent this we must remove or dissolve out this substance, and how are we going to do that. Place the print in hypo, you say, like we did with the plate. Quite right, and it might be just as well for you to do it and see what happens. You will certainly get rid of the silver salt, but I am afraid the color of what was left would not please you, for it is of an unpleasant reddish-brown tint. So before putting the print in the hypo bath it is usual to put the print through a preliminary process called *toning* that improves the color considerably.

Definition of Toning.— Toning in photography really means tinting, or giving it a slight change of color. It might just as well be called gilding, because in the toning bath a thin layer of gold is deposited on the surface of the picture.

Something More About the Paper.— Before proceeding to tone the print, I want you to learn something more about the paper so that you may go about the work intelligently Chloride of silver, you know, is in the paper, but there are other silver salts there too, and they differ from the chloride in this respect, that they can be dissolved in water. If we wish to get nice colored prints we must wash out these soluble silver salts—that is the experience of all photographers.

Washing Before Toning.-- Washing before toning must be very thorough, and should last at least one hour, during which time the prints should pass through about a dozen changes of water. Now, there is a right way and a wrong in such a seemingly simple matter as washing prints. In the first place, you must use for this purpose a couple of dishes that have never been in contact with hypo, for the least trace of that will cause your prints to be discolored with brownish stains that cannot be got rid of. In the second place, when a print is placed in the water the soluble silver that you wish to wash out at once dissolves, and then it forms with certain substances in the water a new combination that is insoluble. You can detect their presence by their giving a milky white appearance to the water. Now, these particles are very apt to get entangled with the soft surface of the gelatin, and when you come to toning the gold will be deposited on them. But in the fixing bath they will be dissolved out and carry the deposit of gold with them, the result being rather unsatisfactory prints.

The Right Way to Wash Prints.—Take one tray, preferably of white earthenware, fill it comfortably with water at a temperature of 60 degrees. Take a print and slide it under the water face up and almost immediately turn it face down. Repeat this with the rest of the prints. At the end of a minute, not longer, transfer the prints one by one into the second tray, beginning with the print first soaked. Now empty the first tray, fill it with water, and at once transfer the prints back to it. The quicker this is done the better. Still working quickly, give them another change of water—using plenty of it. By this time you will have got rid of most of the soluble silver and you may proceed at a more leisurely pace, say five minutes between changes. But all the same the prints must not be allowed to mat together, and you must work steadily, removing the bottom print and placing it on the top so that the water can have free access to every part of the print. All the time they must be kept face down so that particles of matter in the water may not settle on the film. In removing from the one tray to the other they must be carried over one by one, never in a bunch for the reason already given.

Preparing the Toning Bath.—With each package of the brand of paper the manufacturer gives a formula for preparing a toning bath, and I would advise you to follow it. But if you wish to try something else, I can recommend the following as being simple and giving excellent results with most kinds of water, for you should know some waters are not altogether suited for giving the best results in photography: Gold for toning comes in little bottles, each containing 15 grains, and this quantity should be dissolved in 15 ounces of water, preferably distilled, and kept in a glass-stoppered bottle in the dark This gives us a stock solution containing one grain of gold to each ounce of water. For use, pour in your toning tray, which must be absolutely clean and free from any trace of hypo, one ounce of this solution and add 25 ounces of water. Now, throw in it a piece of red litmus paper, used to test the water as to whether the bath is acid or alkaline, and then add a small pinch of borax. Stir the bath until it is dissolved. If the red litmus paper turn blue, you may commence toning; if not, add a little more borax until the change occurs.

Toning.—The bath being ready, take a print and place it in the water, face down, taking care that the print gets completely and evenly soaked, which may be attained by turning it face up and then face down. Put in other prints the same way, but a beginner should never have more than half a dozen prints in the bath at one time. They should be kept moving about so that one does not lie above the other for any length of time, as that will prevent the toning going on evenly all over the print.

Changes in the Toning Bath.—At first no great change will be apparent, but soon the bright red color will change to a brown, from that to a purple and thence to a blue. Select the color you like, and stop just before the print reaches it, for it will lose somewhat in the fixing bath. When the print is sufficiently toned, place it face down in a dish of clean water; take another print from the first dish and place it in the toning bath, continuing in this way until all are finished. If at any time toning appears to stop, it shows that the bath is exhausted and a little more gold should be added; and if necessary, a little more borax.

Washing After Toning.—The prints should be passed through a couple of changes of water after being toned, being handled exactly as before toning.

Fixing the Prints.—A fixing bath, consisting of:

Water	20	ounces
Hypo	1	ounce
Alum	¼	ounce

should be prepared and the prints placed in this for fifteen minutes. While here they must be kept in continual motion, the lower print being brought to the top in its turn so that the solution may have free access all the time.

Washing after Fixing.— The prints, after being removed from the fixing bath, must be washed for half an hour to rid them of the hypo, during which they must have a change at least every five minutes, and be kept moving about. They are then ready for mounting.

Handling Prints.— On no consideration must the fingers touch the surface of the paper at any time, or stains will be produced. While it is dry, each sheet should be caught by the edges between thumb and fingers, as if you were holding a pack of cards, and when it is wet it should be "spooned" up in the palm of the hand. As they should always be face down in the bath, the palm can be placed on them, and then with a scooping motion they can be removed, and then dropped on the top or placed in another bath, as may be necessary. When being examined in printing frame, the edge can be turned up by means of a quill toothpick. *All operations connected with filling or emptying of frames and examining prints must be conducted in subdued daylight. Toning must be done in very weak daylight, or by artificial light.*

CHAPTER X.

COMBINED TONING AND FIXING BATH.

Toning and Fixing Bath.— It is possible to perform both the operations of toning and fixing prints in one bath, and here it is unnecessary to give them the preliminary washings that is essential when toning and fixing are done separately. Therefore this method is the favorite of the lazy man or the one pushed for time. But it is not to be recommended, as the whites are never so pure as with the other method, and there is a decided probability of the pictures becoming discolored at no distant date. Notwithstanding this drawback it is very popular with beginners, providentially so, for in a few years it consigns to sweet oblivion their earliest efforts when anything satisfied.

Formula for Combined Bath.—

Hot water	1 quart
Hypo	8 ounces
Sulphocyanide of ammonium	1 ounce
Acetate of lead	6 drams
Citric acid	2 drams
Powdered alum	2 drams
Pure chloride of gold	6 grains

Dissolve thoroughly in the foregoing order, then let stand for twenty-four hours to settle, and use the clear portion.

Toning in Combined Bath.— The prints, just as they come from the frame, are immersed one by one in the solution, where they at once turn to a yellowish tinge, at the same time fading away till scarcely visible. Then they gradually become redder and brighter, recovering their former brilliancy. The action proceeds much the same way as in the separate bath method, and if left long enough the prints will become quite blue. As the pictures darken in color somewhat in drying, they should be removed from the bath a little before the desired color is attained. Fiv ounces of this bath will tone a dozen 4 by 5 prints; then it should be thrown away. Temperature should be about 55 degrees.

Washing After Combined Bath.— After passing through the combined bath the prints should be washed exactly as after fixing in the separate baths, when they will be ready for mounting.

CHAPTER XI.

MOUNTING PRINTS.

Preparing the Paste.—In a tea cup place about a teaspoonful of starch and add to it a *small* quantity of water, with the spoon rub it to a perfectly smooth cream, and then pour in, with constant stirring, boiling water until the paste takes on a transparent bluish tint. When cold, the paste should be moderately firm, but not so stiff that it cannot be readily applied with a brush. Should it be too thick, it can be thinned down by the addition of a little water.

Preparing the Prints for Mounting.—Take a piece of glass, failing that the bottom of your washing tray, and on it lay the prints face down as they come from the final washing water. Let them lie any way, the one overlapping the other. Then get rid of the surplus water by rolling a clean towel over them.

Mounts.—Anything of the nature of cardboard will not do for a mount, as ordinary boards contain substances that will destroy the prints. Special mounts prepared for photographic use should be used.

Applying the Paste.—Take a stiffish brush — a shaving brush does very well — work it in the paste a little and then apply it to the back of the print on top of the heap, going over it in various directions a few times so as to work the paste into the print. Just sufficient should be left to cause the print to stick to the mount — how much this is can be learned only by experience.

Applying Print to Mount.—Slip the edge of a knife under the print, lifting it up sufficiently far to allow the middle finger of the left hand to pass well underneath. Then catch the print between the finger and thumb, lay down the knife, lift up the print, turn it round, catch it the same way with right hand, and change the grip with the left. Hold it over the mount till it looks square and in the center, and lay it down. If it be a little bit out, it can easily be slid into proper position. In handling a print before and during mounting, the fingers should never touch the edges, as the grease will be very apt to prevent sticking. Now place a sheet of oiled paper on the print, and then with the ball of the thumb work from the center of the print outward so as to press it in close contact with the mount. All the time the fingers of the left hand must press the edge of the oiled paper and print to prevent the latter slipping around. Now remove the oiled paper, and then with a dampened sponge run round the edges of the print to remove any surplus paste, and a final rub over the print will not hurt any.

Mounting with Prepared Pastes.— There are many excellent prepared pastes on the market that must be handled somewhat differently. They work very smoothly, but stick most tenaciously. In working over them with the brush it must not go beyond the edges, and when the print is placed on the mount it must go into the right position at once, as it cannot be slid about. To secure this, take a piece of brown paper the size of the mount and in the center of it cut out a hole the size of the print. By applying this paper to the mount, one can mark with a pencil the points where the corners of the print will fall, so that there will be no difficulty in getting it into position the first trial. A neat job is assured by pressing the print in contact with a roller squeegee, which can be bought at any photographic supply house.

RIGHT IN IT WITH BOTH FEET.

Drying Mounted Prints.—The prints dry best when the air has free access all round. To secure this, make saw cuts in a block of wood about an inch apart. Stick the edge of the mount into one of these.

To Get Rid of Curling in Mounts.—At first the mounts curl outward, and then they curl inward as they dry. To get rid of this, take them before they are absolutely dry and place them back to back and face to face, with blotters between to absorb the moisture. Then place a heavy weight on them, or, better still, put them in a copying press till they are perfectly dry.

Burnishing.—Photographers straighten their prints in a burnisher or polishing machine. It is rather a costly machine, and so I would advise you to ask the local photographer to do it for you, which he will probably do for a small charge. You can, however, improve your prints, when burnishing is not possible, by rubbing a piece of flannel on dry Castile soap and then going over the face of the print as it lies on a table. This will remove all lint from the print and give a gloss and brightness to the picture.

CHAPTER XII.

PRINTING AT NIGHT.

Bromide Printing.— The average dabbler in photography is pretty closely tied down to business affairs in the daytime and consequently is unable to utilize the sun's rays as much as he would like for printing his pictures. The evening is the amateur's time for rounding up his results. It is then he develops, does toning and mounting, makes up albums from his collection and generally enjoys himself with his hobby. And fortunately for him, then also can he print, for some of the most effective pictures that can be made owe much of their beauty to the nature of a process that can be worked at night, and is known as bromide printing.

Bromide Paper.— This paper derives its name from the fact that it consists of a bromide of silver emulsion — in fact, like what is used on the plate for making the negative, only it is supported on white paper and is very much slower — that is to say, it requires a very much longer exposure than would an ordinary plate to secure a certain result.

How Marketed.—There are many firms who manufacture very slow bromide emulsion papers which are popularly classified under the general title of "gas-light" printing papers. It is possible for me to do little more than mention their names: Velox, Dekko, Vinco, Cyko, Uko, Kruxo; and possibly before this edition is fairly on the market other brands may be in the field. On account of the slow speed of the emulsion they can be worked in any ordinary artificial light, so that no special darkroom is necessary for their use. My readers may wonder a little how this can be possible, but let them recollect that the intensity of light varies with the square of the distance, and the point will be clear. For instance, if they must give one minute's exposure with a certain negative at one foot distance from the light, the exposure at 4 feet distance would be 16 minutes, not 4 as one would be apt to suppose. But development is very quick, therefore long before the action of the light could produce much effect on the emulsion the paper would be developed and in the fixing bath. These papers are all supplied in packages of one dozen sheets, cut to standard sizes.

How to Expose Bromide Paper.—Place the negative in a printing frame as if for ordinary printing; then, by the light of the ruby lamp, fill in a sheet of the paper, of course placing the sensitive side next the film. As both sides look very much alike, it is sometimes a little difficult to know just which is which, but the sheets have a decided tendency to curl with the sensitive side inward, so that side can always be readily distinguished. The frame being filled, the package should be closed to protect the balance of the paper, then exposure should be made to the light of a gas burner or an ordinary kerosene lamp. In making the exposure, the frame should be held at a stated distance from the flame, so that when once the correct time to give for a particular negative has been found, there will be no difficulty about getting the same result every time. In my own practice, I generally set my darkroom lamp on the table at a certain place and set the frame at a line drawn on the table, so that the distance from flame to frame is always the same, which in my case is about eighteen inches. With very dense negatives I go a little nearer, with rather thin ones a little farther away. Of course, I remove the ruby glass before making the exposure.

Development of Bromide Papers.— The instructions given by the makers are so excellent on this point that I simply recommend that they be implicitly followed.

CHAPTER XIII.

CONCLUDING REMARKS.

Getting Some One to "Do the Rest."— There are occasions when even the most earnest workers do not find it convenient to finish their own work, and prefer to hand over their developing, printing and mounting to others to do. In all large cities there are firms who make a business of doing this very work, and the names of some of them — I can guarantee their reliability — are to be found in the advertising pages. A certain list of prices has come to be recognized as standard among them, and for the information of the reader are given here:

SIZE.	DEVELOPING. Each.	PRINTING.	
		Unmounted.	Mounted.
1½ inches wide	2 cents.	2 cents.	2 cents.
2 " "	3 "	5 "	6 "
Up to 4 by 5 inches	5 "	6 "	8 "
5 by 7 "	10 "	10 "	12½ to 15 cents.

Ready Prepared Solutions.— It is not every beginner who feels himself capable, and even if he were, finds it convenient to at first prepare all his own solutions, baths, pastes, etc., and such individuals will have no difficulty in purchasing them ready prepared. It is not my business to recommend any particular firm's goods, but I may say this, that each one tries its best to turn out nothing but what is first-class.

About Studying.—The only way to learn a subject thoroughly is to give it a little time *every day*. That does not mean that you are to be always exposing plates or otherwise using material, but it certainly means that you are to at least do a little thinking about photography, and, better still, do considerable reading about it. For instance, you should read this book over and over again, and very likely you will find in it a great deal more than you at first supposed. Then get another book on the subject. On the cover pages of this book you will find advertised more advanced books on photography, which lead up to it by easy steps. Then it is always wise to take at least one journal devoted to a subject one is interested in. When I began photography I took no less than four, and read them thoroughly; and I have never regretted it. Please don't say they are too far advanced; I have heard that too often. I can assure you that as an editor it is my constant endeavor to provide the readers with matter treating of ordinary photography, and I know hundreds of readers who ordered the journal just as soon as they bought their camera, and they all say that while at first it did look just a little bit stiff for them, they very soon found themselves quite at home, and made rapid progress. And while I am speaking as an editor, let me say another word. Please do not send a post card to every photographic journal asking for a *free* sample. Every copy costs far more than the price asked for it, so you can understand that a sufficient number of free copies would soon ruin any magazine. When you, therefore, want to see a copy of any photographic journal, suppose we say THE PHOTO-BEACON, first ask your dealer if he does not stock it, and if he does not, then wr the office, inclosing stamps for the published price.

Last Words.— Remember,

THE HISTORY OF FAILURES IS THE HISTORY OF PROGRESS

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